549 A LONGITUDINAL STUDY TO ASSESS THE FUNCTIONAL CHANGES CAUSED BY HYALURONIC ACID (HA) INJECTION (DUROLANE) IN OSTEOARTHRITIS KNEES USING VIBRATION ANALYSIS AND MAGNETIC RESONANCE IMAGING

S. Salari[1], H. Wu[1], C. Webber[1], C.O. Fuentes[2], R.A. Ogilvie[2], R. Bobba[2], J.F. MacGregor[1], J.D. Adachi[1]. *[1]McMaster University, Hamilton, ON, CANADA, [2]Hamilton Health Sciences, Hamilton, ON, CANADA*

Purpose: The purpose of this longitudinal study was to assess the functional changes caused by HA acid injection into the knees of patients suffering from osteoarthritis (OA). Our hypothesis in this ongoing research project is that Durolane, a type of synthesized HA, which acts as a viscous lubricating fluid would improve the mechanical functionality of the joint and reduce friction between the articulating surfaces of the knee. This improvement would in turn result in less vibration generated by the knee during motion.
Methods: 11 patients, diagnosed with severe OA, were recruited from local rheumatology clinics. Before the injection, each patient was tested with a vibration analysis device. The patient also underwent a full anatomical MRI scan of the knee. In addition, patients were asked to complete the WOMAC pain, stiffness and functionality assessment questionnaires. After the baseline vibration recording and MRI of the involved knee, patients were injected with 3 ml of Durolane. After the injection, the patient was asked to do some mild exercise, for 10 to 15 minutes and a second vibration test was performed in the injected knee. The patient was asked to return for follow-up studies one week, 5 weeks, 9 weeks and 13 weeks after the injection. At each follow-up appointment the injected knee was tested again with sound analysis and the patient was asked to fill out the WOMAC questionnaire. At the final appointment, the MRI scan of the injected knee was repeated.
Analysis: As reported elsewhere, we have developed a vibration based statistical model of the functionality of the articulating surfaces of the knee in healthy and OA patients. By projecting vibration data from the patients injected with HA into this statistical model, we expect to identify trends of improvement after the injection followed by a gradual worsening of the knee functionality as time elapses and the injection effects disappear.
Results: To date we have performed baseline and early follow-up measurements in 4 patients. Eleven patients who will be receiving the Durolane injection have been recruited. Figure 1 shows the hypothesized results for 1 patient superimposed upon a vibration test report. We anticipate that such results will allow an objective assessment of the effectiveness of therapy in each patient.

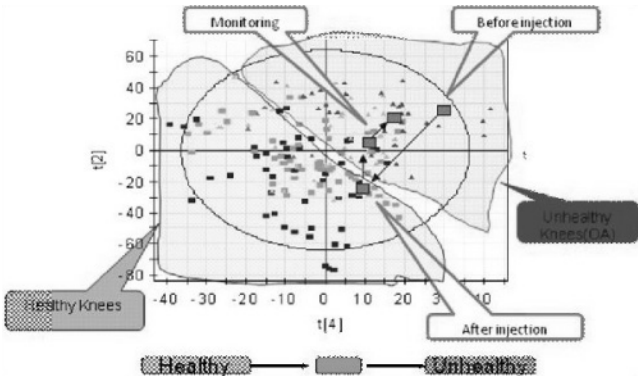

Figure 1: Hypothesized trajectory of patient's knee smoothness before and after receiving Durolane injection

Conclusions: We are hoping that if we get promising results from our current research, the technique can be used as a potential tool to assess the functionality of the joint and for monitoring treatment effectiveness.

550 THERAPEUTIC PAIN MODULATION OF OSTEOARTHRITIS OF THE L-S SPINE ASSOCIATED WITH DEGENERATIVE LUMBAR DISC DISEASE, CHRONIC LUMBAR RADICULOPATHY, MUSCLE SPASM AND FIBROMYALGIA

J.P. Figueroa. *Harrington Memorial Hospital, Southbridge, MA, USA*

Purpose: Osteoarthritis (OA) of the LS spine tends to present with degenerative lumbar disc disease (DDD), chronic lumbar radiculopathy (CLR), muscle spasm (M-SP) and fibromyalgia (FIBRO). Optimal treatment of this condition can necessitate multiple medications sequenced for the best clinical effect.
Methods: Traditional medical training has been to avoid opiates even if the patient's pain level is moderate to severe and even if basic activities of daily living remain significantly impaired. This is for reasons not only of narcotic dependency and constipation but also for sleep fragmentation, anxiety and depression as well. In these instances the patient may experience unrelenting pain and have profound disturbances on their sleep cycle. Not untypically the continuous disturbances in their sleep cycle can be associated with the appearance of FIBRO. Fibrositic tenderpoint's located in the paralumbar and sacroiliac regions will further compound the low back pain that the patient is experiencing.
More recently there has been described an improvement in both the quality and duration of sleep associated with the use of long-acting opiates for chronic low back pain associated with osteoarthritis. These patients can typically experience FIBRO along with the associated chronic sleep disturbance of their low back pain. The intensity of this pain frequently is such that it will not allow sufficient pharmacologic sleep augmentation to occur. This results in less than desired decrease in tenderpoint discomfort. Once the appropriately titrated dose of long-acting opiate has been achieved then typically a formulation such as branded tizanidine capsules can have a very beneficial effect on the patient's sleep. Only then will there occur a reduction in fibrositic tenderpoint discomfort as well as other associated fibromyalgia related symptoms such as fatigue, stiffness, headache and depression.
Interestingly, ulterior pain modulation of the lower back occurs with the diclofenac patch 1.3% (applied to the lower back of the aforementioned patients). There occurs a level of pain reduction that is beyond that which would be expected with typical oral NSAID use. While the diclofenac patch has been approved for use in low back strain it has not been investigated for complex clinical low back pain conditions as presented.
Results: The clinical case presentations demonstrate the benefit of appropriately titrated long acting opiates. Also seen is an additional degree of analgesic relief with the diclofenac patch 1.3%. Once pain has been adequately modulated only then can sleep augmentation be successfully introduced with tizanidine capsules to treat co existing FIBRO. The clinical result is a much more optimally controlled level of pain and a higher level of function.
Conclusions: Just as in the treatment of hypertension and cancer, typically the treatment of low back pain associated with OA, DDD, M-SP and FIBRO may require the use of multiple medications. When traditional treatment methods fail to arrive at an acceptable clinical result then appropriately titrated opiates can be effective. Non narcotic diclofenac patches offer additional clinical benefit. Once pain modulation is adequately accomplished, tizanidine capsules can be used to effectively treat coexisting fibromyalgia.

Therapy – Surgery

551 TREATMENT OF CARTILAGE DEFECTS IN THE KNEE USING ALGINATE BEADS CONTAINING HUMAN MATURE ALLOGENIC CHONDROCYTES

K.F. Almqvist Sr, A.A. Dhollander Jr., P.C. Verdonk Jr., R. Forsyth Sr., R. Verdonk Sr., G. Verbruggen Sr.. *Ghent University Hospital, Gent, BELGIUM*

Purpose: To determine whether the implantation of alginate beads containing human mature allogenic chondrocytes in symptomatic cartilage defects of the knee results in structural regeneration of the joint surface and improves clinical outcome.
Methods: A biodegradable, alginate-based biocompatible scaffold containing human mature allogenic chondrocytes was used for the treatment of chondral and osteochondral lesions in the knee. Twenty-one patients were clinically prospectively evaluated with use of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) and a Visual Analogue Scale (VAS) for pain preoperatively and at 3, 6, 9 and 12 months of follow-up. Of the 21 patients, 13 had consented to the taking of a biopsy for investigative purposes from the area of implantation at 12 months of follow-up, allowing histological assessment of the repair tissue.
Results: A statistically significant clinical improvement became apparent after 6 months and patients continued to improve during the 12 months of follow-up. Adverse reactions to the alginate/fibrin matrix seeded with